

January 2014 - A Quarterly Publication

NASA Kepler provides insight about five new rocky planets

BY MICHELE JOHNSON

More than three-quarters of the planet candidates discovered by NASA's Kepler spacecraft have sizes

ranging from that of Earth to that of Neptune, which is nearly four times as big as Earth. Such planets dominate the galactic census but

are not represented in our own solar system. Astronomers don't know how they form or if they are made of rock, water or gas.

The Kepler team this month reports on four years of ground-based follow-up observations targeting Kepler's exoplanet systems at the American Astronomical Society meeting in Washington. These observations confirm the numerous Kepler discoveries are indeed planets and yield mass measurements of these enigmatic worlds that vary between Earth and Neptune in size.

Included in the findings are five new rocky planets ranging in size from ten to eighty percent larger than Earth. Two of the new rocky worlds, dubbed Kepler-99b and Kepler-406b, are both forty percent larger in size than Earth and have a density similar to lead. The planets orbit their host stars in less than five and three days respectively, making these worlds too hot for life as we know it.

A major component of these follow-up observations were Doppler

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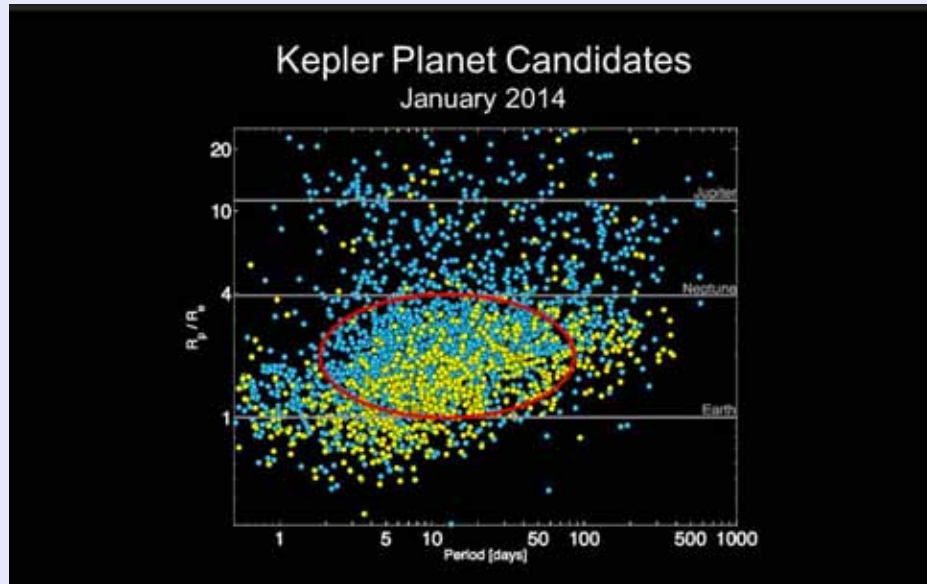


Chart of Kepler planet candidates as of January 2014. NASA Image

NASA's latest space technology small satellite phones home

BY RACHEL HOOVER AND JAMES SCHWAB

PhoneSat 2.4, NASA's next generation smartphone cubesat has phoned home. The tiny spacecraft that uses an off-the-shelf smartphone for a brain has completed checkout and sent back data confirming all systems are "go" for the spry spacefarer.

PhoneSat 2.4, a cube approximately four inches square, weighs only about 2.2 pounds, and was developed at Ames. It is the first of the PhoneSat family to use a two-way S-band radio, allowing engineers to command the satellite from Earth. It is confirming the viability of using smartphones and other commercially available electronics in satellites destined for low-Earth orbit.

"It's great to hear from NASA's most recent cubesat spacecraft," said Michael Gazarik, NASA's associate administrator for space technology in



NASA Ames engineers are building PhoneSats, seen here, demonstrating how "off the shelf" consumer devices can lead to new space exploration capabilities.

NASA photo by Dominic Hart

Washington. "NASA is committed to opening up the high frontier to a new generation of explorers who can take advantage of these sorts

of small satellites to do science and technology development at a fraction of the cost of larger, more complex spacecraft."

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Ames researcher receives presidential early career award

BY JESSICA CULLER

On Dec. 23, 2013, President Obama named five NASA researchers, including Joshua S. Alwood of Ames as recipients of the 2012

our nation and advance the scientific frontiers."

The 2012 NASA recipients were nominated by the agency's Science Mission Directorate, Office of the Chief

Engineer and Office of the Chief Technologist. The recipients are:

-- Joshua S. Alwood, at NASA Ames for research into the temporal changes in skeletal tissue density, cancellous orientation and vasculature during recovery from musculoskeletal disuse.

-- Douglas C. Hofmann, at NASA's Jet Propulsion Laboratory in Pasadena, Calif., for his innovative research in metal-matrix composites for future NASA missions.

-- Randall L. McEntaffer, at the University of Iowa, for development of high resolution and high throughput X-ray gratings for use in the next generation of space-based X-ray spectrometers.

-- Tamlin M. Pavelsky, at the University of North Carolina, for outstanding research and leadership advancing satellite remote sensing of river discharge, including enabling the broader community to develop and improve algorithms for SWOT, a future NASA satellite.

-- Patrick C. Taylor, at NASA's Langley Research Center in Hampton, Va., for exceptional early career achievements and innovations that



NASA photo by Dominic Hart

Joshua Alwood, in the Bone and Signaling Lab at Ames, recipient of the 2012 Presidential Early Career Award for Scientists and Engineers (PECASE). He received the award for his research into the temporal changes in skeletal tissue density, cancellous orientation and vasculature during recovery from musculoskeletal disuse.

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Presidential Early Career Award for Scientists and Engineers (PECASE). These recipients, and 97 other federal researchers, will receive their awards in a ceremony early this year in Washington.

The PECASE awards represent the highest honor bestowed by the U.S. government on scientists and engineers beginning their research careers. The award recognizes recipients' exceptional potential for leadership at the frontiers of scientific knowledge and their commitment to community service as demonstrated through professional leadership, education or community outreach.

"These early career scientists and engineers represent some of the best and brightest talent in our agency and our university partners," said NASA Chief Scientist Ellen Stofan. "We are delighted to see them win this prestigious award. Their contributions, ranging from micro-gravity and space radiation effects, X-ray spectrometry, advanced composites, remote sensing and climate research will benefit

Holdren addresses Ames employees



NASA photo by Eric James

In December 2013, John Holdren, the senior advisor to President Barack Obama on science and technology issues through his roles as Assistant to the President for Science and Technology, Director of the White House Office of Science and Technology Policy, and Co-Chair of the President's Council of Advisors on Science and Technology (PCAST), visited Ames. Holdren also was the special speaker for a short town hall-style all hands with Ames staff (Holdren is above right during the all hands and Ames Center Director S. Pete Worden is on the left). As the principal advisor to the President and others within the Executive Office of the President, Holdren's office advises on the effects of science and technology on domestic and international affairs.

Ames hosts Breakthrough Prize in Life Sciences event in Hangar One

NASA Ames established a non-reimbursable Space Act Agreement with Breakthrough Prize in Life Sciences (BPLS) to host an awards ceremony at Ames Dec. 12, 2013 in Hangar One. The BPLS is a not-for-profit corporation dedicated to advancing

highly regarded scientific and technical awards such as the Draper and National Academy of Sciences Awards. NASA is a recognized world leader in life sciences and physics with key contributions being made to the field by people at NASA Ames. This high-

profile event brings well-deserved and needed attention to the importance of Science Technology Engineering and Math (STEM) education, which is one of the Agency's primary missions. The invitation-only event was produced and directed by the internationally acclaimed Don Mischer Produc-

Hangar One seen here in brilliant blue. The historic hangar was lit up in an array of colors, courtesy of the event planners and sponsors of the Breakthrough Prize in Life Sciences event held at Moffett Federal Airfield in December 2013.

NASA photo by Paul Langston



ing breakthrough research, celebrating distinguished scientists and generating excitement about the pursuit of science as a career.

The BPLS award ceremony, for approximately 350 invited people, honors achievements in life science and physics and is on par with other

at Ames highlighted throughout the evening. BPLS will broadcast the awards ceremony Jan. 27 for the Discovery Channel that will promote life sciences, physics and other STEM-related fields to a world-wide audience.

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Chief Scientist presents all hands

In November 2013, NASA Chief Scientist Ellen Stofan presented an all hands at Ames entitled "Looking Outward, Inward and Homeward: The Value of NASA Science." NASA's investments in science began with the agency's inception and have evolved into a complex portfolio spanning multiple disciplines and centers. As the principal advisor on the agency's science programs and science-related strategic planning and investments, she shared insights and perspective from the vantage point of the agency's top leaders.



NASA photo by Dominic Hart

SOFIA selects educator teams for 2014 science flights

BY NICK VERONICO

NASA's Stratospheric Observatory for Infrared Astronomy (SOFIA) will become a flying classroom for teachers during research flights in the next few months.

Twelve two-person teams have been selected for SOFIA's Airborne Astronomy Ambassadors program, representing educators from 10 states. Each will be paired with a professional astronomer to observe first-hand how airborne infrared astronomy is conducted. After their flight opportunities, Airborne Astronomy Ambassadors will take what they learn back to their classrooms and into their communities to promote science literacy.

SOFIA is a highly modified Boeing 747SP jetliner fitted with a 100-inch (2.5-meter) effective diameter telescope. The aircraft flies at altitudes

sadors teams have witnessed SOFIA's world-class astronomical science and have used this experience in hundreds of science, technology, engineering and math teaching opportunities throughout the United States."

Astronomers Association and Fox Astronomical Observatory, Fort Lauderdale, Fla.

Marcella Linahan, Carmel Catholic High School, Mundelein, Ill. and Lynne Zielinski National Space Society, Long



Airborne Astronomy Ambassadors (from left to right) Constance Gartner, Vince Washington, Ira Hardin and Chelen Johnson at the educators' workstation aboard the SOFIA observatory during a flight in February 2013.

photo by Pam Harman

photo by Nick Veronico



Astronomer Jim De Buizer (left) talks to SOFIA Airborne Astronomy Ambassador Marita Beard (foreground) while FORCAST instrument principal investigator Terry Herter explains the images on his computer screen to ambassador Theresa Paulsen during an astronomy flight.

between 39,000 and 45,000 feet (12-14 kilometers), above the water vapor in the Earth's atmosphere and collects data in the infrared spectrum.

"SOFIA offers educator teams unprecedented access to infrared astronomers and the unique capabilities of an airborne observatory," said John Gagosian, SOFIA program executive at NASA Headquarters in Washington. "Previous Airborne Astronomy Ambas-

SOFIA's Airborne Astronomy Ambassadors for 2014 are:

Megan Tucker and Dan Molik, The Palmdale Aerospace Academy, Palmdale, Calif.

Barbel Sepulveda, Lincoln High School and Chris Rauschenfels, Sierra Middle School, Stockton, Calif.

Nathan Mahoney, Pine Crest School, Deerfield Beach, Fla. and Héllen Tavora, South Florida Amateur

Grove, Ill.

Judi Little and LeeAnn Vaughan, Burke High School, Omaha, Neb.

Margaret Holzer, Chatham High School, Somerset, N.J. and Theresa Roelofsen Moody, New Jersey Astronomy Center at Raritan Valley Community College, High Bridge, N.J.

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NASA brings Earth science 'Big Data' to the Cloud with Amazon Web Services

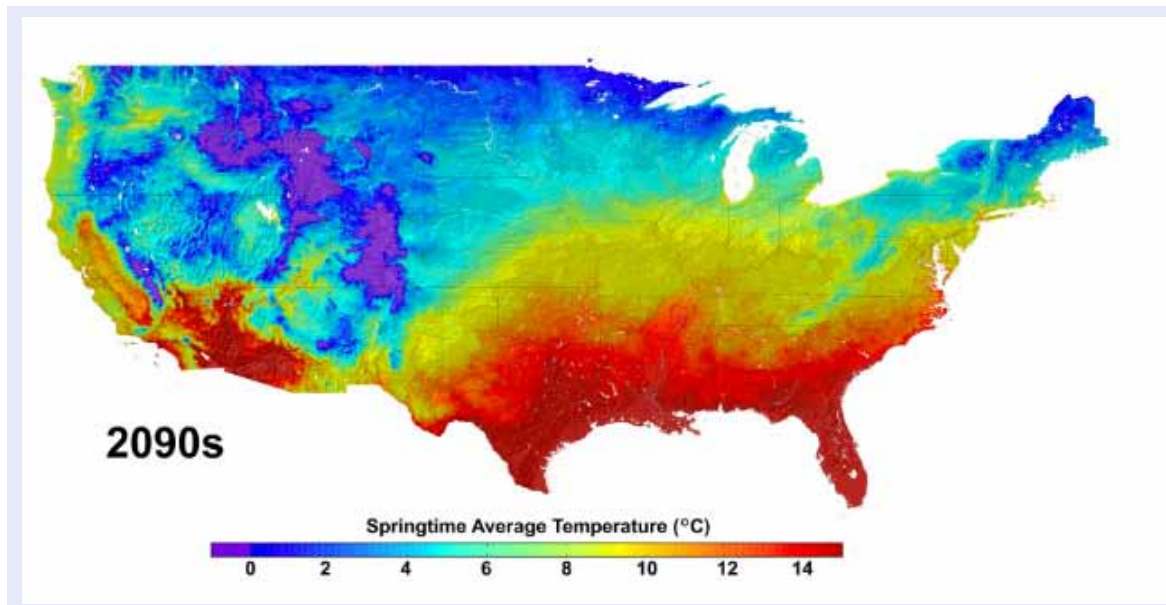
BY RUTH DASSO MARLAIRE

NASA and Amazon Web Services Inc. (AWS) of Seattle, Wash., are making a large collection of NASA climate and Earth science satellite data

"We are excited to grow an ecosystem of researchers and developers who can help us solve important environmental research problems," said Rama Nemani, principal scientist

gest existing continuous space-based record of Earth's land.

NASA climate data sets provided to AWS will continue to be available to the public in a full and open manner.



Climate change projections for the United States, such as the data shown in this image of average springtime temperature changes by the 2090s, will be available on the cloud through an agreement with Amazon Web Services. This data was produced by the NASA Earth Exchange (NEX), a research platform of the NASA Advanced Supercomputer Facility at Ames.

available to research and educational users through the AWS cloud.

The system enhances research and educational opportunities for the U.S. geoscience community by promoting community-driven research, innovation and collaboration.

"NASA continues to support and provide open public access to research data, and this collaboration is entirely consistent with that objective," said NASA Chief Scientist Ellen Stofan at the agency's headquarters in Washington. "Earth science research is important to every person on the planet, and we welcome contributions from all researchers in improving our understanding of Earth and its climate."

This agreement allows NASA and AWS to experiment with a new way to provide data services. By using the cloud, research and application users worldwide gain access to an integrated Earth science computational and data management system they can use on their own.

The service encompasses selected NASA satellite and global change data sets -- including temperature, precipitation, and forest cover -- and data processing tools from the NASA Earth Exchange (NEX), a research platform of the NASA Advanced Supercomputer Facility at Ames.

for the NEX project at Ames. "Our goal is that people can easily gain access to and use a multitude of data analysis services quickly through AWS to add knowledge and open source tools for others' benefit."

NEX is a collaboration and analytical platform that combines state-of-the-art supercomputing, Earth system modeling, workflow management and NASA remote-sensing data. Through NEX, users can explore and analyze large Earth science data sets, run and share modeling algorithms, collaborate on new or existing projects and exchange workflows and results within and among other science communities.

NASA has uploaded terabytes of data from three satellite and computer modeling datasets to the AWS platform and will upload more in the future. One data set, the NEX down-scaled climate simulations, provides high-resolution climate change projections for the 48 contiguous U.S. states. The second data set, provided by the Moderate Resolution Imaging Spectroradiometer (MODIS) instrument on NASA's Terra and Aqua satellites, offers a global view of Earth's surface every one to two days. Finally, the Landsat data record from the U.S. Geological Survey provides the lon-

The effort continues NASA's adoption of cloud platforms to enhance digital services, enabling NASA to make more U.S. government data easy to find and access without having to download large amounts of data. In line with the Obama Administration's Open Data Executive Order, this new collaboration encourages citizen entrepreneurs to create businesses, innovate, and conduct scientific research.

The NASA datasets will be available through the Amazon Public Data Sets program at: <http://aws.amazon.com/datasets>

This website provides a centralized repository of selected public data sets that can be integrated into AWS cloud-based applications to reduce the time and cost associated with transferring large data sets.

"By bringing these NASA public data assets into the AWS cloud, we help NASA engage a larger community for global change impact modeling and analysis as well as data sciences innovation in general," said Jamie Kinney, AWS senior manager for scientific computing. "Together, NASA and AWS are delivering faster time to science and taking the complexity out of accessing this important climate data."

Ames highlights Mars and the Sun at American Geophysical Union

NASA Ames researchers presented new findings on a wide range of Earth and space science topics at the annual meeting of the American Geophysical Union (AGU) held in December 2013. The meeting took place Dec. 9-13, 2013 at the Moscone Convention Center in San Francisco. NASA's media briefings during the meeting featured topics such as the latest discoveries from Mars and Saturn's moon Titan, prospects for the recovery of the Antarctic ozone hole, Comet ISON, and close-up views of the sun from a NASA spacecraft launched this year. In addition, NASA scientists and their colleagues who use NASA research capabilities presented noteworthy findings during scientific sessions that were open to registered journalists. John Grunsfeld, Associate Administrator for Science Mission Directorate, NASA Headquarters (left lower photo) is seen here speaking at the recent AGU meeting in December.



NASA photos by Eric James



McNally discusses procurement initiatives

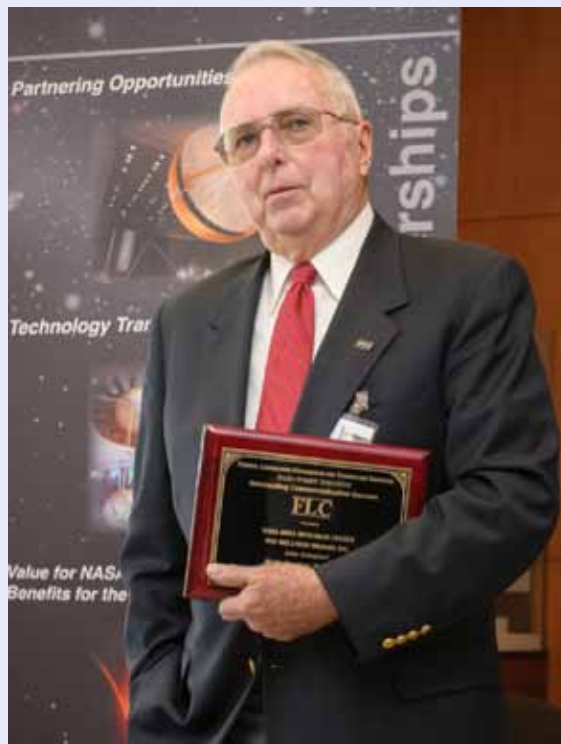
NASA's Assistant Administrator for Procurement, Bill McNally, visited Ames in October 2013. He hosted a meeting with the Ames Contractor Council as well as a center town hall for the resident staff. McNally spoke about the need to reduce transaction costs in NASA procurements and other new initiatives in the procurement environment from a NASA Headquarters perspective.



NASA photo by Dominic Hart

Greenleaf receives FLC award for rehydration beverage

John Greenleaf recently received the 2013 Far West Region Federal Laboratory Consortium (FLC) Award for Outstanding Commercialization Success of his "Rehydration Beverage." The rehydration beverage was developed to help keep astronauts at peak performance during missions. The beverage was researched, qualified and patented as a highly effective electrolyte concentrate formula that maintains and restores optimal body hydration levels quickly and conveniently. Developed as a remedy for dehydration, it helps prevent the loss of body fluids during heavy exercise, heat exposure and illness. It also can be used to treat and prevent dehydration caused by altitude sickness and jetlag. Greenleaf is seen here, right, holding the FLC award following the recent award ceremony held at Ames.



NASA photo by Dominic Hart

Ames' Sustainability Base recognized with Governor's award



NASA photo by Eric James

Thirteen California organizations, including NASA Ames were recognized with the 2013 Governor's Environmental and Economic Leadership Award (GEELA), the state's highest environmental honor from the California Environmental Protection Agency, "for building the first federal facility to receive LEED Platinum rating for new construction." Features include a graywater reclamation system and an intelligent adaptive control system.

Center director welcomes back employees post-furlough



photo by Astrid Albaugh

On Oct. 17, 2013, Ames Center Director S. Pete Worden stood at the Ames front gate (above) to personally and enthusiastically welcome employees back to the center post-furlough. The furlough lasted Oct. 1 - 16, 2013. Worden addressed Ames employees and their questions (left) during the post-furlough all hands Oct. 18 and updated them about the latest information regarding the startup following the furlough.

NASA photo by Dominic Hart

NASA's Asteroid Grand Challenge discussed at all hands



NASA photo by Dominic Hart

In September 2013, Ames employees were invited to listen to NASA's Asteroid Grand Challenge Program Executive Jason Kessler at an all hands meeting at the center. This meeting included a presentation of NASA's Asteroid Grand Challenge followed by a question-and-answer session. Since 1998, NASA's Near Earth Object Observation (NEOO) Program has led the global effort to find potentially hazardous asteroids and has successfully found 95 percent of the potentially devastating 1 km wide near-Earth asteroids. More needs to be done; asteroid impacts and explosions from objects much smaller than 1 km, have the capability of rendering massive devastation. It will take a global effort with innovative solutions to accelerate the search for all of these potentially hazardous asteroids. Earlier this summer, NASA announced the Asteroid Grand Challenge to find all asteroid threats to human populations and know what to do about them. Recognizing the power of traditional and innovative collaboration - including the use of public private partnerships, citizen science, crowdsourcing and incentive prizes, in addition to international and other cooperative partnerships - NASA will lead a dialogue addressing how to best use these methods to aid in solving this global problem, together.

Employees recognized at 2013 Ames Honor Awards ceremony

The Ames Honor Awardees received their awards during a ceremony in November 2013, in the Syvertson Auditorium. Thanks to every employee who submitted a nomination this year and congratulations to these deserving employees. The list of the 2013 Ames Honor Awardees follows:

Administrative Assistant Support/Secretary:

Arelene C. Spencer

Administrative Professional:

Dolores D. Beasley
Heather H. Logan

Best First Paper:

Laura J. Simurda

Commercialization/Technology Transfer:

Michael J. Aftosmis

Contractor Employee:

Anna Bui Cordrey, Deltha-Critique
Jennifer R. Campbell, Orbital Sciences Corporation
Dennis R. Gaskins, ASRC Research & Tech Solutions
Michael A. Gross, Universities Space Research Association
Donald J. Kalar, San Jose State University Foundation
Laura K. Kushner, Aerospace Computing Inc.
Lynne H. Martin, San Jose State University Foundation
Duy D. Nguyen, Jacobs Technology Inc.
Thoth Nowland, Jacobs Technology Inc.
Laura E. Plice, Metis Technology, Inc.
Scott Prevost, Computer Sciences Corporation
Shawn Seader, SETI Institute
Shivanjli Sharma, Stinger Ghaffarian Technologies, Inc.
Rosa C. Yancy, Ames Child Care Center

Education and Outreach:

Beverly E. Girten

Engineer:

Karen L. Gundy-Burlet
Nghia D. Vuong

Group/Team:

Ames Photo/Video Group
Bion-M1 Project Team
Cell Bio Tech Demo Team
Exploration Ground Data Systems (xGDS) Development Team
IRIS Project Mission Group
Kepler Spacecraft Operations Team
Millimeter-wave Thermal Launch System (MTLS) Team
PhoneSat Team
Sea Grass/Coral Reef UAV Team
SOFIA Observatory Pointing Team
SpaceShop Team

Mentor:

Mark A. Beskind
Dean P. Giovannetti
Manuel O. Herrada
John A. Hogan
William G. Warmbrodt
Diane H. Wooden

Project Management:

Nicole A. Rayl

Scientist or Researcher:

Jeffrey M. Moore

Special Appreciation:

Michael T. Downs, Kennedy Space Center
Michelle M. Munk, Langley Research Center
Marc A. Seibert, Kennedy Space Center

Student:

Aileen V. Aniciete
Young Sang Park

Supervisor/Manager:

Andrew G. Demo

Technical Support/Professional:

Steve Jara
Lauren Nguyen Ladwig

Technician:

James B. Scott

ADEPT team installs cover on prototype model



In August 2013, the Adaptable, Deployable Entry Placement Technology (ADEPT) team installed the cloth cover on an engineering prototype model. The ADEPT concept is a mechanically deployable semi-rigid aeroshell entry system capable of achieving low ballistic coefficient during entry suitable for a variety of planetary or earth return missions leveraging Ames' expertise in thermal protection system material and entry system design, development and testing.

Astronaut Chris Hadfield converses with MythBuster's Adam Savage



NASA photo by Dominic Hart

Ames employees were invited to attend an event featuring Colonel Chris Hadfield (right) in an interesting conversation with Adam Savage of MythBusters (left) Nov. 8, 2013 in the Ames Visitor Center. "Good morning, Earth." That is how Colonel Chris Hadfield—writing on Twitter—woke up the world every day while living aboard the International Space Station for more than five months. Since blasting off from Kazakhstan in December 2012, Hadfield has harnessed the power of social media to make outer space accessible to millions and infusing a sense of wonder into the collective consciousness. Called "the most famous astronaut since Neil Armstrong" by the BBC, Hadfield—now safely back on Earth—continues to bring the glory of science and space travel to everyone he encounters.

SOFIA selects educator teams for 2014 science flights

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Michael Maccarone and Elizabeth Rosenberger, Avenues: The World School, New York

Tom Jenkins, Dayton Regional STEM Center, Enon, Ohio, and Heidi Steinbrink, Oakwood Senior High School, Springfield, Ohio

Robert Black, North Medford High School, and Dave Bloomsness, Southern Oregon Skywatchers, Medford, Ore.

George Hademenos and Diane Watson, Richardson High School, Richardson, Texas

Kim Abegglen and Anna-Melissa Lyons, Hockinson Middle School, Vancouver, Wash.

Kathy Gustavson, Nicolet High School, Whitefish Bay, Wisc., and

Jean Creighton University of Wisconsin—Madison, Manfred Olson Planetarium, Milwaukee.

"Educators are selected through a rigorous peer-reviewed process for this yearly professional development opportunity," said astronomer Dana Backman, manager of SOFIA's education and public outreach programs at NASA Ames. "To date, the Airborne Astronomy Ambassadors' program has flown 15 teams totaling 31 educators from 17 states, and we look forward to working with this new cadre of educators as they take NASA science into their communities."

SOFIA is a joint project of NASA and the German Aerospace Center (DLR). The aircraft is based at the

Dryden Aircraft Operations Facility in Palmdale, Calif. NASA's Dryden Flight Research Center in Edwards, Calif., manages the program. Ames manages the SOFIA science and mission operations in cooperation with the Universities Space Research Association (USRA) in Columbia, Md., and the German SOFIA Institute (DSI) at the University of Stuttgart.

For more information about SOFIA, visit: <http://www.nasa.gov/sofia> and <http://www.dlr.de/en/sofia> For information about SOFIA's science mission and scientific instruments, visit: <http://www.sofia.usra.edu> and <http://www.dsi.uni-stuttgart.de/index.en.html>

Bauschlicher discusses computational improvements



On Nov. 19, 2013, Charles Bauschlicher, left, presented the fourth presentation in a series of "Ames Distinguished Employee Lectures presented by the Scientific and Professional (ST) Community." His presentation was entitled, "From Computational Chemistry to Computational Materials." Bauschlicher gave an overview of the computational methods that are used to solve problems of interest to NASA. He discussed the methods used to study large molecules and materials. Several examples were given to illustrate the range of problems that have been studied.

NASA photo by Tom Trower

NASA's latest space technology small satellite phones home

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In April 2013, NASA successfully demonstrated a one-week mission with PhoneSat 1.0. With an expected orbital lifetime of up to one year, PhoneSat 2.4 will measure how well commercially developed components perform in space over a long period of time. This innovative application of commercially developed technologies for use in space provides for low-cost, low-risk, highly repetitive missions to meet some unique NASA science and exploration needs.

The spacecraft was among 11 agency-sponsored cubesats deployed Nov. 19 by a NASA-built Nanosatellite Launch Adapter System aboard an Orbital Sciences Minotaur 1 rocket for the U.S. Air Force from the Mid-Atlantic Regional Spaceport at NASA's Wallops Flight Facility in Virginia.

PhoneSat 2.4 also will test a system to control the orientation of the cubesat in space. Like the earlier PhoneSat 1, PhoneSat 2.4 uses a Nexus S smartphone made by Samsung Electronics running Google's Android operating system. Santa Clara University in California is providing the ground station for the mission.

The smartphone provides many of the functions the satellite needs to operate, such as computation, memory, ready-made interfaces for communi-

cations, navigation and power, all assembled in a rugged package before launch. Data from the satellite's subsystems, including the smartphone, the power system and orientation control system are being downlinked over amateur radio at a frequency of 437.425MHz.

The next PhoneSat, version 2.5, is scheduled to launch in February 2014, hitching a ride aboard a commercial SpaceX rocket. That spacecraft also is expected to perform in Earth orbit for several months and continue testing the two-way radio and orientation systems. The PhoneSat Project is managed by the Engineering Directorate at Ames.

The PhoneSat series of missions are pathfinders for NASA's next Small Spacecraft Technology mission, the Edison Demonstration of Smallsat Networks (EDSN). The EDSN mission is composed of eight identical 1.5-unit cubesats, which are each approximately four inches by four inches by six inches in size and weighing about 5.5 pounds, that will be deployed during a launch from Kauai, Hawaii in 2014.

The EDSN mission will demonstrate the concept of using many small spacecraft in a coordinated cluster to study the space environment and

space-to-space communications techniques. The eight EDSN satellites each will have a Nexus S smartphone for satellite command and data handling, with a scientific instrument added as a payload on each spacecraft.

During EDSN, each cubesat will make science measurements and transmit the data to the others while any one of them can then transmit all of the collected data to a ground station. This versatility in command and control could make possible large swarms of satellites to affordably monitor Earth's climate, space weather and other global-scale phenomena.

The PhoneSat Project is one of many development projects within NASA's Small Spacecraft Technology Program, one of nine programs within NASA's Space Technology Mission Directorate. The Small Spacecraft Technology Program develops and matures technologies to enhance and expand the capabilities of small spacecraft, with a particular focus on communications, propulsion, pointing, power and autonomous operations.

For more information about PhoneSat, the Small Spacecraft Technology Program and NASA's Space Technology Mission Directorate, visit: <http://www.nasa.gov/spacetech>

Mas Omura, Ames scientist and engineer, passes on

Masayuki "Mas" Omura was born in San Jose, Feb. 12, 1939. He passed away Oct. 26, 2013. He was a 1957 graduate from Campbell High School and in 1962, received his bachelor of science/master of science from MIT in electrical engineering. He was a member of Eta Kappa Nu, Tau Beta Pi 1961. In 1967, Mas received his doctor of philosophy from Stanford in electrical engineering. He was known for his research in shock waves, plasma diagnostics, microwave radiometry and avionics. He published papers on plasma diagnostics and shock wave precursor. From 1967 to 1997, Mas worked at NASA Ames. He spent a year at NASA headquarters in Washington, D.C. as a program manager for Data Systems in the Guidance Control and Information Systems Divisions. Mas retired from NASA in 1997 as the deputy director of Center Operations and had made great contributions to many Ames science and engineering projects. He also was

NASA photo by Roger Brimmer



Masayuki "Mas" Omura

very active with the Asian American Pacific Islander Advisory Group (AA-PIAG) before his retirement.

Mas had three main passions in his life. First and foremost was his family, particularly his grandchildren, who loved him dearly. His second passion was singing. He was a member of a Japanese karaoke club for 30 years. He sang in Honolulu, Kobe and Hiroshima, Japan and throughout California from San Francisco to Los Angeles. Finally, Mas loved to travel. He loved airplanes and boats. After retiring from NASA, he traveled to the Middle East, Asia, Costa Rica, Mexico and all over Europe.

He is survived by his wife Claire (Fujita); daughters Jeanne (James Kim) and Anne (Whitty Somvichian) and grandkids Sarah, Mari, Sean, Tomiko and Emiko; his mother Shizuko of Morgan Hill; brothers Jim and George; and sisters Akiko (Dave Kubo) and June (Tom Crow). Private memorial services were held at the Morgan Hill Buddhist Church. In lieu of flowers and koden, please donate to your favorite charity.



Darryll R. Stroud

Darryll R. Stroud, 84, passed away Sept. 25, 2013, after a two-year battle with cancer. A native

Darryll Stroud, former Graphics and Exhibits branch chief, dies

of San Francisco and graduate of Washington High School, he was a Navy veteran and retired NASA Ames employee of 34 years, starting his career with the National Advisory Committee for Aeronautics (NACA) then NASA, as a technical illustrator and branch chief for the Graphics and Exhibits Branch and merged Publications Branch within the Technical Information Division, Center Operations Directorate. He and his wife, Dorothy, raised three children in Sunnyvale, Calif., before retiring to Lake of the Pines, Calif., in 1990.

Darryll was active in the Masonic Lodge (Mountain View), Indian Guides, Eastern Star (Past Patron) and was a volunteer for many years at the Sacramento International Airport, the Sacramento Jazz Festival and with the Special Olympics. He

was a member of the Retired United Airlines Employee's Association and National Active and Retired Federal Employees Association (NARFE). Darryll and Dorothy travelled extensively to Europe during retirement and enjoyed many hiking trips in Switzerland with friends.

Darryll is survived by his wife of 57 years, Dorothy; daughter Diane (Steve) Haag; son Kenneth Stroud; daughter Nancy (Brian) Pantiga; and six grandchildren: Brian, Sarah, Jennifer, Hannah, Taylor and Kyle. A memorial was held October 2013 at the Eureka Masonic Lodge of Auburn. In lieu of flowers, please donate in his memory to The Shriners Hospital or a charity of your choice.

Former Ames-Dryden site manager Marty Knutson dies

COURTESY OF NASA DRYDEN

Former research pilot and Dryden site manager Martin A. "Marty" Knutson passed away Dec. 11, 2013. Best known for flying the Lockheed U-2 prior to and during his NASA career, Knutson led the center through the first decade of space shuttle flight operations and was responsible for obtaining several SR-71 Blackbirds for use as high-altitude, high-speed research platforms.

Born May 31, 1930, in St. Louis Park, Minn., he attended the University of Minnesota, majoring in electrical engineering. Knutson began his flying career as an Air Force aviation cadet in 1950. Following service in Korea and participation in developmental testing and operational missions in the F-84 and F-86, he was recruited by the Central Intelligence Agency in 1955 to fly the U-2. During his 15-year stint in covert intelligence, he became one of a handful of pilots to overfly the Soviet Union. In 1970, he ended his CIA service and retired from the Air Force, having logged more than 6,500 flying hours.

At that time, officials at NASA Ames were trying to obtain two U-2C aircraft for the agency's Earth resources science program. Carl Duckett, the CIA's deputy director for science and technology, persuaded Knutson to sign on as project manager and in 1971 Knutson helped draft an operational plan and made arrangements for Lockheed to overhaul two airplanes that had been in storage. He also served as one of several NASA U-2 pilots, and later flew the ER-2, an updated model that joined the NASA fleet in 1981.

In May 1984, Knutson was appointed Director of Flight Operations for Ames, and was also assigned additional duty as site manager of the Dryden Flight Research Facility, then subordinate to Ames. During the next six years, he maintained the facility at operational readiness for space shuttle landings, replaced Dryden's aging fleet of F-104 support aircraft with modern F/A-18 Hornets and provided leadership for flight research programs including the X-29 forward-swept-wing technology demonstrator; the Controlled Impact Demonstration, an intentional crash of a remotely piloted airliner loaded with an experimental fire-resistant fuel additive; the



NASA photo

Martin A. "Marty" Knutson

F-15 Digital Electronic Engine Control project that integrated propulsion and flight controls for greater efficiency; the Pegasus air-launched rocket for placing small payloads into low-Earth orbit; the CV-990 Landing Systems Research aircraft, which tested improved braking systems for the space shuttle; and the F-18 High-Alpha Research Vehicle.

After the Air Force announced the impending retirement of the SR-71, the only aircraft capable of sustained Mach 3 speeds and cruising flight above 85,000 feet, Knutson successfully sought to acquire three Blackbirds for Dryden. In late 1990, he returned to Ames where he served as Chief of

Flight Operations until his retirement in 1997.

His awards include the Meritorious Service Medal and the Distinguished Flying Cross, both from the Air Force, NASA's Outstanding Leadership Award and the Presidential Rank of Meritorious Executive. He twice received the CIA Intelligence Star. He was an Associate Fellow of the Society of Experimental Test Pilots and a charter member of the federal government's Senior Executive Service.

He is survived by his four children Marty, Eric, Kristin and Robin; and five grandchildren Eric, Brandon, Samantha, Joshua and Natasha.

Researcher receives early career award

continued from page 2

have advanced scientific understanding of the Earth's climate system.

The PECASE awards were created to foster innovative developments in science and technology, increase awareness of careers in science and engineering, give recognition to the scientific missions of participating agencies, enhance connections

between fundamental research and many of the grand challenges facing the nation, and highlight the importance of science and technology for America's future. For a complete list of 2012 award winners, visit: <http://www.whitehouse.gov/the-press-office/2013/12/23/president-obama-honors-outstanding-early-career-scientists>

NASA Kepler provides insight about five new rocky planets

continued from front page

measurements of the planets' host stars. The team measured the reflex wobble of the host star, caused by the gravitational tug on the star exerted by the orbiting planet. That measured wobble reveals the mass of the planet: the higher the mass of the planet, the greater the gravitational tug on the star and hence the greater the wobble.

"This marvelous avalanche of information about the mini-Neptune planets is telling us about their core-envelope structure, not unlike a peach with its pit and fruit," said Geoff Marcy, professor of astronomy at University of California, Berkeley who led the summary analysis of the high-precision Doppler study. "We now face daunting questions about how these enigmas formed and why our solar system is devoid of the most populous residents in the galaxy."

Using one of the world's largest ground-based telescopes at the W. M. Keck Observatory in Hawaii, scientists confirmed 41 of the exoplanets discovered by Kepler and determined the masses of 16. With the mass and diameter in-hand, scientists could immediately determine the density of the planets, characterizing them as rocky or gaseous, or mixtures of the two.

These density measurements dictate the possible chemical composition of these strange, but ubiquitous planets. The density measurements suggest that the planets smaller than Neptune – or mini-Neptunes – have a rocky core but the proportions of hydrogen, helium and hydrogen-rich

molecules in the envelope surrounding that core vary dramatically, with some having no envelope at all.

The ground-based observation research validates 38 new planets, six of which are non-transiting planets only seen in the Doppler data. The paper detailing the research is published in the *Astrophysical Journal*.

A complementary technique used to determine mass, and in turn density of a planet, is by measuring the transit timing variations (TTV). Much like the gravitational force of a planet on its star, neighboring planets can tug on one another causing one planet to accelerate and another planet to decelerate along its orbit.

Ji-Wei Xie of the University of Toronto, used TTV to validate 15 pairs of Kepler planets ranging from Earth-sized to a little larger than Neptune. Xie measured masses of the 30 planets thereby adding to the compendium of planetary characteristics for this new class of planets. The result also was published in the *Astrophysical Journal* in Dec. 2013.

"Kepler's primary objective is to determine the prevalence of planets of varying sizes and orbits. Of particular interest to the search for life is the prevalence of Earth-sized planets in the habitable zone," said Natalie Batalha, Kepler mission scientist at NASA Ames. "But the question in the back of our minds is: are all planets the size of Earth rocky? Might some be scaled-down versions of icy Neptunes or steamy water worlds? What fraction are recognizable as kin of our rocky,

terrestrial globe?"

The dynamical mass measurements produced by Doppler and TTV analyses will help to answer these questions. The results hint that a large fraction of planets smaller than 1.5 times the radius of Earth may be comprised of the silicates, iron, nickel and magnesium that are found in the terrestrial planets here in the solar system.

Armed with this type of information, scientists will be able to turn the fraction of stars harboring Earth-sized planets into the fraction of stars harboring bona-fide rocky planets. And that's a step closer to finding a habitable environment beyond the solar system.

Ames is responsible for the Kepler mission concept, ground system development, mission operations, and science data analysis. NASA's Jet Propulsion Laboratory in Pasadena, Calif., managed Kepler mission development. Ball Aerospace & Technologies Corp. in Boulder, Colo., developed the Kepler flight system and supports mission operations with the Laboratory for Atmospheric and Space Physics at the University of Colorado in Boulder. The Space Telescope Science Institute in Baltimore archives, hosts and distributes Kepler science data. Kepler is NASA's 10th Discovery Mission and was funded by the agency's Science Mission Directorate.

For more information about the Kepler space telescope, visit: <http://www.nasa.gov/kepler>

Ames employees enjoy BBQ and Safety Fair/Fun Run



NASA photo by Jon Pierre Wiens



NASA photo by Dominic Hart

The Ames Exchange held a barbeque picnic in the fall of 2013 at NACA Park that coincided with the Ames Safety Street Fair and Fun Run Walk and Fitness Challenges. "Safety: It's in our DNA" was the theme.

Ames Ongoing Monthly Events Calendar

African American Advisory Group (AAAG) Mtg., last Tuesday of each month, 12 - 1 p.m., Bldg. N-255, Rm. 101C. POC: Rose King, ext. 4-3442.

Moffett Aikido Club, Monday and Wednesday evenings, 6:30 p.m., Bldg. 944. Aikido is a non-competitive, defensive martial art known as the "Way of Harmony." POC: Diane Pereda (650) 575-9070 or Robert Dean (650) 787-1007, email: mfaikido@aol.com

Ames Amateur Radio Club, third Thursday of each month, 12 noon, N-T28 (across from N-255). POC: George Tucker, at ext. 4-2200.

Ames Bluegrass Club, every Tuesday from 11:30 a.m. to 1 p.m. in Bldg. 944. Players of all instruments and all levels are welcome, but we are particularly interested in experienced players willing to help improve the group's musical skills. POC: Bob Haberle at ext. 4-5494 or email: robert.m.haberle@nasa.gov

Ames Bocce Ball Club, Ames' newest Exchange-sponsored club is seeking members. POC: Mike Lindsay email: michael.c.lindsay@nasa.gov

Ames Bowling League, Homestead Lanes Thursdays at 6 p.m. Need substitute bowlers. Sign up questions: Steve Howard at ext. 4-4884.

Ames Contractor Council Mtg., first Wednesday of each month, 11 a.m., Bldg. N-200, Committee Room. POC: Herb Finger at ext. 4-6598.

Ames Federal Employees Union (AFEU) Mtg., third Wednesday of each month, noon. Bldg. N-204, Rm. 101. Guests welcome. Check for schedule changes at: <http://www.afeu.org>. POC: Paul K. Davis, ext. 4-5916.

Ames Golf Club, Members have the opportunity to play approximately 13 tournaments per year at a variety of 18-hole golf courses in the Bay and Monterey Area. POC: Barry Sullivan: Barry.T.Sullivan@nasa.gov.

Ames Green Team (formerly the Green Ames Working Group) meetings are held the first Tuesday of each month in Bldg. N-237, Rm. 101, from 10-11 a.m. For information, call Roger Ashbaugh, Ames Environmental Management Division, ext. 4-5660. <http://environmentalmanagement.arc.nasa.gov/reports/eo-13514.html>

The Hispanic Advisory Committee for Excellence (HACE) Mtg., first Thursday of each month, 11:30 a.m. - 12:30 p.m., Bldg. N-255, Rm. 101C. POC: Jeanette Zamora, jeanette.zamora-ortega-1@nasa.gov.

Ames Jazz Band Club, Bldg. 944, 5:30 p.m. - 7 p.m. POC: Ralph Bach, email: ralph.e.bach@nasa.gov

Jetstream Toastmasters, Mondays, 12 p.m. - 1 p.m., Bldg. N-269, Rm. 179. POC: Tim Steiger, ext. 4-0195, tim.steiger@nasa.gov. Web: <http://jetstream.freetoasthost.com>

Ames Nimble Knitters Club, every Tuesday at 11:30 a.m., Bldg. N210, Rm. 141. POC: Rosalyn Jung, knifan2@yahoo.com or Diane Alexander at ext. 4-3140. URL: <http://knit.arc.nasa.gov>

Ames Roller Hockey Club, meets daily from noon to 1 p.m. at rink on north end of the 80-foot-by-120-foot wind tunnel. Players should have experience skating and must wear protective equipment.

Ames Safety Committee, third Thursday of each month, 10 a.m. - 11 a.m., Bldg. N-237, Rm. 200. POC: John Livacich, jlivacich@mail.arc.nasa.gov, ext. 4-3243.

Women's Influence Network (WIN), first Wednesday of each month, Bldg. N-232, Rm. 227, 12:00 - 1:00 p.m., POC: Wendy Holforty, wendy.l.holforty@nasa.gov

Orphanage Without Borders Mtg., Mondays, Bldg. 211, Room 205, 11:30 a.m.-12:30 p.m. The mission of Orphanage Without Borders (OWB) is to improve the lives of children living in orphanages and abandoned children. Our goal is to create a network of organizations that work together to provide children worldwide with the acceptable standards of life such as education, health, hygiene, discipline, affection, responsibility, hope of future, shelter, nutrition, clean water, joy and safety. We aim to apply these standards universally, meaning that they will be independent of the nationality, religion, culture, race, political opinion or social class of the children or orphanage location. For additional information contact Miguel at mvcharcos@orphanagewithoutborders.org or mcharcos@sofia.usra.edu.

Physical Inventory Underway

Ames' annual 100 percent wall-to-wall physical inventory for NASA tagged, bar-coded property is proceeding as scheduled. As a reminder, all controlled equipment documented on a NASA Form 892 "Employee Property Pass/Loan Agreement and Removal Permit" must have their NF 892 up to date. Employees are encouraged to bring in that property for scanning. Property passes are assigned to those people authorized to carry government equipment on and off Ames Research Center. If you have questions, contact Nelson Japlit at ext. 4-3428.

Exchange Information

Information about products, services and opportunities provided to the employee and contractor community by the Ames Exchange Council. Visit our web site at: <http://exchange.arc.nasa.gov>

Beyond Galileo Gift Shop N-235 in the cafeteria, 8 a.m. to 2 p.m., ext. 4-6873

Visitor Center Gift Shop (Exploration Center), Tues-Fri, 10 a.m. to 4 p.m., Sat. - Sun, 12 - 4 p.m., ext. 4-5412

Remember to purchase your baby shower, birthday and holiday gifts at Ames' two gift shops!

Mega Bites Cafeteria N-235, 6 a.m. to 2 p.m., ext. 4-5969/Catering ext. 4-2161

Barcelona Café Bldg. 3, 6:30 a.m. to 2 p.m., ext. 4-4948/Catering ext. 4-4948

See daily menus at: <http://exchange.arc.nasa.gov/cafe/menu.html>

Moffett Field Golf Club with 'Tee minus One' Grill and Sports Bar. Catering available. Call (650) 603-8026. Extended Happy Hour Thursdays, \$5 and \$6 pitchers of beer starting at 4 p.m. to 8:30 p.m.

RV Lots available. Call to reserve a space at (650) 254-1808.

Civilian/Contractors, \$50/mo; military \$25/mo

NASA Lodge (Bldg. 19) (650) 603-7100

Where to stay when you're too tired to drive home? What about the lodge?! Two types of rooms: Bldg. 19 (43 rooms), rate: \$65/night (\$5 ea add'l adult); Bldg. 583 A&B (150 rooms), rate: \$55/night (\$5 ea. add'l adult); B547 rate \$60/night (for large groups)

Ames Swim Center (N-109) (650) 603-8025

The swimming pool is now open. Hours of operation are as follows:
Lap swim only:
MWF 10 a.m. - 1 p.m.
MWF 3 p.m. - 6 p.m.
TTH 10 a.m. - 1 p.m.
TTH 4 p.m. - 7 p.m. The pool is heated year round. The pool normally is available for lap swim, pool parties and special events. POC: Ryan Storms, Pool Manager (650) 603-8025. Memberships: single memberships: \$60/yr. Family memberships: \$80/yr. After purchasing a membership, there is an entrance fee: daily entrance fee - \$3/day or lap pass fee - \$50 for 20 uses. Platinum membership - \$380/yr. (no daily fee). Special events: include military training, swim team events, kayak role practice, etc. The cost for special events is \$75/hr, or \$50/hr for military.

Exchange Basketball Gym is now open, Bldg. 2 (650) 603-9717

Hours of operation:
M-F 11 a.m. - 1:30 p.m.
M-F 4 p.m. - 7 p.m.

Chase Park reservations, call ext. 4-4948
NACA Park reservations, call ext. 4-4948

Ames Cat Network

The Ames Cat Network needs help finding homes for cats trapped at Moffett. They range from feral to abandoned/lost pets. They are tested, altered and inoculated. Call Iris at ext. 4-5824 if you or someone you know are interested in fostering or adopting a cat.

Ames emergency announcements

To hear the centerwide status recording, call (650) 604-9999 for information announcements and emergency instructions for Ames employees. You also may listen to 1700 KHz AM radio for the same information.

Wright Brothers' flight celebrated

On Dec. 17, 2013, Ames employees were invited to help celebrate the 110th anniversary of the Wright Brothers' historic flight of the Wright Flyer. Free cake was served in the Mega Bites Café in celebration of the anniversary. Ames Ombuds and Senior Advisor to the Center Director Jack Boyd (right) cut the cake.



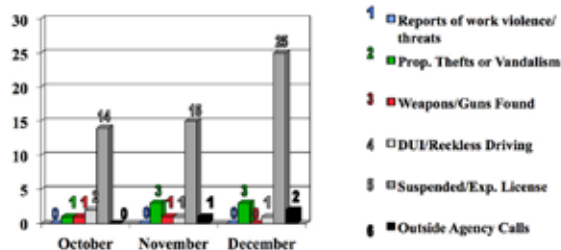
NASA photos by Dominic Hart

Protective Services monthly activity

A statistical summary of activities of the Protective Service Division's Security/Law Enforcement and Fire Protection Services units for the three-month period ending December 2013 is shown below.

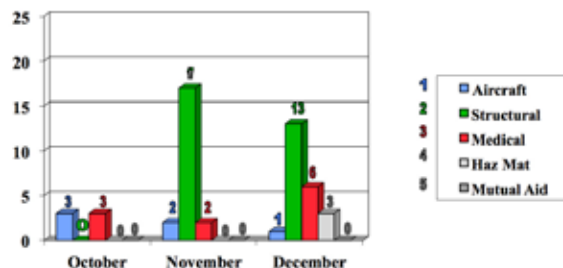
Security/Law Enforcement Activity

Protective Services Office – Activities Security/Law Enforcement Monthly Activity Report



Fire Protection Activity

Protective Services Office – Activities Fire Protection Services



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